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EXAMINER	
DHINGRA, RAKESH KUMAR	
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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/608,091	Applicant(s) STEGER, ROBERT J.	
	Examiner Rakesh K. Dhingra	Art Unit 1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *03* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 September 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-12 and 15-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-12 and 15-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *07 September 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

Applicant's arguments, see pages 12-24, filed 9/7/06, with respect to the rejection(s) of claim(s) 1-12, 15-23 under 35 USC 103 (a) have been fully considered and following comments are furnished:

Claims 1, 4: Applicant argues that in Tamura reference the coolant is not a liquid coolant (as per claim limitation, but rather a gas. Applicant further argues that Tamura discloses a dielectric material 18 but not an electrostatic chuck as per claim limitation. Applicant also argues that there is no motivation or suggestion to combine Tamura with Masuda ("Masuda" appears to be a typo, since the second reference used was "Matsumura et al").

Examiner responds that Tamura uses a cooling gas 7 for flowing between substrate and the dielectric 18, and additionally also uses a coolant 4 that flows in flow passages provided in holding member 2 (Figure 2 and column 9, lines 30-50) [similar to coolant flowing in flow passages 42 (Figure 9)]. However, since Tamura does not expressely teach that the coolant flowing in flow passages 4 (or in flow passages 42) is a liquid coolant, new reference has been found (US PGPUB No. 2001/0009178 – Tamura et al) that teaches that a liquid coolant flows in flow passages in the holding member as explained below. Examiner also responds that in Tamura reference the dielectric material 18 holds the substrate 1 by electrostatic adhesion (column 14, lines 50-66), that is, dielectric 18 functions as an electrostatic chuck and thus reads on claim limitation.

Further, the motivation statement for combining the Tamura reference with Matsumura reference has been modified as indicated below. Since Tamura et al ('805) when combined with Tamura et al ('178) and Matsumura et al reads on claim 1 limitations, claim 1 and dependent claims 2, 4, 6, 7, and 12 have been rejected under 35 USC 103 (a) as explained below.

Claim 7: Applicant argument that Tamura et al teaches away regarding making the heat transfer member in two separate parts is not found persuasive, because Tamura teaches (Figure 15) that heat transfer

member could be made in two parts (a metallic member 52 and a holding member 53) which are then joined together column 19, lines 1-20). Accordingly claim 7 has been rejected as explained below.

Claims 9, 11 – Applicant's argument regarding susceptor 36 not contacting the electrostatic chuck, and the Tamura reference not expressely teaching about elastomeric joint between heat transfer member, electrostatic chuck and the ceramic member is found persuasive. However claims have been rejected under new grounds of rejection using new references (Mimura et al and Wang et al) that teach the claim limitations as explained below.

Claims 3, 15 - Applicant's argument regarding Kadotani refrence not expressely teaching control of heat transfer rate through controlling size of coolant flow passages is found persuasive. However claims have been rejected under new grounds of rejection using an additional new reference (Cardella) that teaches use of liquid coolant in heat transfer member and control of heat transfer rate through controlling size of coolant flow passages.

Claims 8, 19: Applicant argument that official action does not cite prior art for the claim limitation "heat transfer member laterally spaced from the flange" is not found persuasive since Mahawili teaches gap between first member 14 and second member 20 to permit radial expansion of first member (column 4, lines 25-35). Additionally it would be obvious to provide gap/clearance between heat transfer member and flange to take into account the expansion of interfacing parts due to their different thermal coefficients of expansion. Accordingly rejection of claims is maintained.

Remaining claims have also been rejected under 35 USC 103 (a) as explained below.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be

> patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 2, 4, 6, 7, 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over [Tamura et al (US 6,676,805) – as evidenced by Tamura et al (US PGPUB No. 2001/0009178)] in view of Matsumura et al (US patent No. 5,225,663).

Regarding Claims 1, 2: Tamura et al ('805) discloses a substrate support useful in a reaction chamber of a plasma processing apparatus (Fig. 9), the substrate support comprising: a ceramic member (Fig. 9 Item 40); a metallic heat transfer member overlying the ceramic member (Fig. 9 Item 2), the heat transfer member including at least one flow passage through which a coolant can be circulated to heat and/or cool the heat transfer member (Fig. 9 Item 42); and a dielectric material 18 that functions to electrostatically attract the substrate 1 (like an electrostatic chuck) and overlies the heat transfer member (Fig. 9 Item 18 and column 14, lines 50-67), the electrostatic chuck having a support surface for supporting a substrate in a reaction chamber of a plasma processing apparatus (Fig. 9 Item 1) [column 14, lines 35-50]. Tamura et al do ('805) also teaches (Figure 15) that heat transfer member can be made in two parts (that is, metallic member 52 with coolant passages 42 and a holding member 53) which can then be joined together.

Tamura et al ('805) do not expressely teach that the coolant flowing in the flow passage is a liquid coolant, and also do not teach thickness of heat transfer member.

Tamura et al ('178) teach a wafer holding device [Figure 9 – reference numbers of parts are same as in Figure 9 of Tamura et al '805)] comprising a heat transfer member 2 with coolant flow passages 42. Tamura et al ('178) also teach (Figure 15) that heat transfer member can be made in two parts (that is, metallic member 52 with coolant passages 42 and a holding member 53) which can then be joined together. Tamura et al ('178) further teach use of liquid coolant for flowing through the supporting disk {claim 21}[similar to holding member 53 of Tamura et al ('805), implying that liquid coolant is used for

flowing through coolant passages 42 (Figures 9, 15), since holding member 53 and metallic member 52 are joined together].

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use a liquid coolant to flow through flow passage in the heat transfer member as taught by Tamura et al ('178) in the apparatus of Tamura et al (805) as an art recognized coolant material for cooling the heat transfer member.

[Tamura et al ('805) - as evidenced by Tamura et al ('178)] teach a heat transfer member but do not teach its thickness.

Matsumura et al teach an apparatus (Figures 1-3) for processing a semiconductor wafer 8 comprising of a heat transfer plate 1 (having a conductive film heater 2) and a heat insulator 5. Matsumura et al also teach that the heat transfer plate 1A is made of aluminum and can have a thickness varying from 0.1 to 5 mm and that thickness of heat transfer plate is directly related to its heat transfer capacity. Matsumura et al further teach (Figure 2) that by controlling the thickness of heat transfer plate (besides other factors), the heat capacity required and time taken to heat the wafer to a desired temperature could be controlled. Thus, prior art teaching by Matsumura et al anticipates the claimed thickness of heat transfer plate (that is, 1/8 to ¼ inches or 3.17 mm to 6.35 mm) [column 4, line 5 to column 6, line 25].

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to optimize the maximum thickness of heat transfer member (and thus optimize its thermal mass) as taught by Matsumura et al in the apparatus of Tamura et al ('805) and as evidenced by Tamura et al ('178) as an additional control variable for quickly raising and lowering the temperature of heat transfer plate (column 1, lines 49-68).

Regarding Claim 4: [Tamura et al (805) – as evidenced by Tamura et al (178)] disclose that substrate support further comprises a source of temperature controlled liquid (coolant supply portion) in flow communication with the at least one flow passage 42 (Fig. 9 Item 43 and column 14, lines 35-50).

Regarding Claim 6: [Tamura et al (805) – as evidenced by Tamura et al (178)]discloses a heat transfer gas source operable to supply a heat transfer gas between the support surface and the substrate (Fig. 9 Item 21), and a controller operable to (i) control the volumetric flow rate and/or the temperature of the liquid circulated through the at least one flow passage (Fig. 9 Item 43), and/or (ii) to control the flow rate and/or pressure of the heat transfer gas supplied between the support surface and the substrate 9 (column 15, lines 30-55).

Regarding Claim 7: [Tamura et al (805) – as evidenced by Tamura et al (178)] discloses the heat transfer member can comprises a holding member 53 with a flow passage (base) and a metallic member 52 (cover) overlying the base (Figures 15, 16 and column 19, lines 1-20).

Regarding Claim 12: Tamura et al discloses a plasma processing apparatus comprising the substrate support of Claim 1 (Fig. 1).

Claims 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over [Tamura et al (US 6,676,805) – as evidenced by Tamura et al (US PGPUB No. 2001/0009178)] in view of Matsumura et al (US patent No. 5,225,663) as applied to claim 1 and further in view of Kadotani et al (US PGPUB No. 2004/0163601) and Cardella (US Patent No. 6,184,504).

Regarding Claim 3: [Tamura et al (805) – as evidenced by Tamura et al (178)] in view of Matsumura et al teach all limitations of the claim except coolant flow passage dimensions.

Kadotani et al teach an apparatus (Figures 1, 7) that includes a substrate support for supporting a wafer W and having an electrode block 1 (like heat transfer member) with coolant flow passages 11, 12. Kadotani et al further teaches that dimensions of coolant passages 11, 12 could be 5 mm wide X 15 mm height and that dimensions of coolant flow passage are directly related to heat transfer from the coolant to the electrode block (like heat transfer member). It would be obvious to optimize the flow passage dimensions as per heat transfer rate requirements [paragraphs 0077].

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to control (optimize) coolant flow passage dimensions as taught by Kadotani et al in the apparatus of [Tamura et al (805) – as evidenced by Tamura et al (178)] in view of Matsumura et al to obtain desired heat transfer rate between coolant and the heat transfer member.

[Tamura et al (805) – as evidenced by Tamura et al (178)] in view of Matsumura et al and Kadotani et al teach size of coolant flow slits and its relationship to thermal transfer but do not teach that coolant is a liquid coolant.

Cardella teaches an apparatus (Figure 1) for temperature control that includes a heat transfer member 95 that comprises channels 135 through which heat transfer liquid flows. Cardella further teaches that size, number and arrangement of channels 135 is selected as per thermal transfer requirements (column 5, line 61 to column 6, line 20).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to control (optimize) the dimension of liquid coolant flow passage as taught by Cardella in the apparatus of [Tamura et al (805) – as evidenced by Tamura et al (178)] in view of Matsumura et al and Kadotani et al to obtain the desired heat transfer rate.

Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over [Tamura et al (US 6,676,805) – as evidenced by Tamura et al (US PGPUB No. 2001/0009178)] in view of Matsumura et al (US patent No. 5,225,663) as applied to claim 1 and further in view of Oda et al (US 6,474,986).

Regarding Claim 5: [Tamura et al (805) – as evidenced by Tamura et al (178)] in view of Matsumura et al teach all limitations of the claim except the source of temperature controlled liquid includes a Peltier cooler operable to change the temperature of the liquid to a selected temperature.

Oda et al discloses a substrate support wherein the source of temperature controlled liquid includes a Peltier cooler operable to change the temperature of the liquid to a selected temperature (Figures 14-17,

Item 106). Tamura et al in view of Matsumura et al and Oda et al are analogous art because they are from the same field of endeavor, namely semiconductor wafer heating process.

At the time of invention it would have been obvious to a person of ordinary skill in the art to form [Tamura et al (805) – as evidenced by Tamura et al (178)] in view of Matsumura et al's apparatus where the source of temperature controlled liquid includes a Peltier cooler operable to change the temperature of the liquid to a selected temperature in view of the teaching of Oda. The suggestion or motivation for doing so would have been to cool the refrigerant in a cooling container to a predetermined temperature by Peltier effect (Column 2 Lines 37-38). Therefore it would obvious to combine [Tamura et al (805) – as evidenced by Tamura et al (178)] in view of Matsumura et al with Oda et al for the benefit of the source of temperature controlled liquid to include a Peltier cooler operable to change the temperature of the liquid to a pre-determined temperature.

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over [Tamura et al (US 6,676,805) – as evidenced by Tamura et al (US PGPUB No. 2001/0009178)] in view of Matsumura et al (US patent No. 5,225,663) as applied to claim 1 and further in view of Yatsuda et al (US Patent No. 6,488,863) and Mahawili (US patent No. 6,007,635).

Regarding Claim 8: [Tamura et al (805) – as evidenced by Tamura et al (178)] in view of Matsumura et al teach all limitations of the claim except ceramic member having recess to seat the heat transfer member and thickness of recessed member at the recessed surface.

Yatsuda et al discloses a substrate support (Figure 1) that includes a ceramic insulating member 20 (ceramic member) which has a recessed surface and a flange and where an aluminum worktable 18 (heat transfer member) is disposed on the recessed portion of the ceramic member. Yatsuda et al further teach that an electrostatic chuck 28 is in contact with the flange portion of the ceramic member 20.

Yatsuda et al do not teach that worktable (heat transfer member) 18 is laterally spaced from the flange but it would be obvious to keep a gap (space) between the flange and the worktable to allow for thermal expansion of the heat transfer member that is a metallic member (aluminum).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use ceramic member having a recess as taught by Yatsuda et al in the apparatus of [Tamura et al (805) – as evidenced by Tamura et al (178)] in view of Matsumura et al to enable proper support and insulation for the heat transfer member.

[Tamura et al (805) – as evidenced by Tamura et al (178)] in view of Matsumura et al and Yatsuda et al do not teach thickness of recess member at the recessed surface.

Mahawili teaches a substrate support apparatus (Figure 1) that includes a second member 18 with a support surface (recess) 20. Mahawili also teaches that recess is sized to allow radial (lateral) expansion of the first member (like heat transfer member) 14, that is, a gap is provided between the flange and the heat transfer member. Mahawili further teaches that recess depth (related to thickness of recessed portion) is sized so as to allow seating of first member 14 such that substrate 12 is seated flush with the upper surface of 18a of second member 18 (column 4, lines 20-35).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use ceramic member configuration as taught by Mahawili in the apparatus of [Tamura et al (805) – as evidenced by Tamura et al (178)] in view of Matsumura et al and Yatsuda et al to allow for thermal expansion of heat transfer member (metallic) and also to allow for unimpeded flow of process gases across the surface of wafer (column 4, lines 30-35).

Claims 9, 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over [Tamura et al (US 6,676,805) – as evidenced by Tamura et al (US PGPUB No. 2001/0009178)] in view of Matsumura et

al (US patent No. 5,225,663) as applied to claim 1 and further in view of Mimura et al (US Patent No. 7,022,616).

Regarding Claim 9: [Tamura et al (805) – as evidenced by Tamura et al (178)] in view of Matsumura et al teach all limitations of the claim including the substrate support further comprising a ceramic susceptor (like a ring) 36 [Figure 9 and Column 15, lines 20-23] overlying the ceramic member 40 and surrounding the heat transfer member 2 and the dielectric member (electrostatic chuck) 18, the heat transfer member being laterally spaced from the ceramic ring.

[Tamura et al (805) – as evidenced by Tamura et al (178)] in view of Matsumura et al teach that the susceptor ring 36 serves as a cover for dielectric material 18, but do not teach the susceptor (ring) 36 contacts the electrostatic chuck.

Mimura et al teach a plasma apparatus (Figure 1) comprising a substrate support table 2 on which an electrostatic chuck 6 is disposed and where a focus ring (ceramic ring) 5 surrounds and contacts the electrostatic chuck 6 (column 3, lines 5-65).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention use a ceramic ring that contacts and surrounds an electrostatic chuck as taught by Mimura et al in the apparatus of [Tamura et al (805) – as evidenced by Tamura et al (178)] in view of Matsumura et al to enable shield the electrostatic chuck from deposition by the reaction products.

Regarding Claim 10: Mimura et al teach RF power sources 15, 26 connected to table 2 (heat transfer member) [Figure 1 and column 3, lines 10-25].

Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over [Tamura et al (US 6,676,805) – as evidenced by Tamura et al (US PGPUB No. 2001/0009178)] in view of Matsumura et al (US patent No. 5,225,663) as applied to claim 1 and further in view of Wang et al (US PGPUB No. 2002/0075624).

Regarding Claim 11: [Tamura et al (805) – as evidenced by Tamura et al (178)] in view of Matsumura et al teach all limitations of the claim except the substrate support further comprising an elastomeric joint between the ceramic member and the heat transfer member, and an elastomeric joint between the heat transfer member and the electrostatic chuck.

Wang et al teach a plasma apparatus (Figures 1, 2, 6) comprising an electrostatic chuck assembly 55 that includes an electrostatic member 100 (electrostatic chuck) is bonded to base 175 (heat transfer member) by a ductile and compliant layer 250 (elastomeric joint). Wang et al also teach that base 175 is in turn bonded to support 190 (ceramic member) by a compliant and ductile material 295 (elastomeric joint) [paragraphs 0036, 0038, 0056, 0063, 0066].

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention use elastomeric joints for bonding ceramic member, electrostatic chuck and heat transfer member as taught by Wang et al in the apparatus of [Tamura et al (805) – as evidenced by Tamura et al (178)] in view of Matsumura et al to absorb thermal stresses arising due to different thermal coefficients of expansion of the interfacing materials (paragraph 0056).

Claims 15, 18 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over [Tamura et al (US 6,676,805) – as evidenced by Tamura et al (US PGPUB No. 2001/0009178)] in view of Kadotani et al (US PGPUB No. 2004/0163601) and Cardella (US Patent No. 6,184,504).

Regarding Claim 15: [Tamura et al (805) – as evidenced by Tamura et al (178)] teach all limitations of the claim (as explained above under claim 1) including heat transfer member with liquid flow passages. [Tamura et al (805) – as evidenced by Tamura et al (178)] do not teach liquid circulation through heat transfer member at a rate of 0.25 – 2 degrees C/sec.

Kadotani et al teach an apparatus (Figures 1, 7) that includes a substrate support for supporting a wafer W and having an electrode block 1 (like heat transfer member) with coolant flow passages 11, 12. Kadotani

et al further teaches the dimensions of coolant passages 11, 12 as 5 mm wide X 15 mm height, also teaches that dimensions of coolant flow passage are directly related to heat transfer from the coolant to the electrode block (like heat transfer member). It would be obvious to optimize the flow passage dimensions as per heat transfer rate requirements [paragraphs 0077].

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to control (optimize) coolant flow passage dimensions as taught by Kadotani et al in the apparatus of [Tamura et al (805) – as evidenced by Tamura et al (178)] in view of Matsumura et al to obtain desired heat transfer rate between coolant and the heat transfer member.

[Tamura et al (805) – as evidenced by Tamura et al (178)] in view of Matsumura et al and Kadotani et al teach that heat transfer rate is directly related to dimensions of coolant flow passage, but do not teach that coolant is a liquid coolant.

Cardella teaches an apparatus (Figure 1) for temperature control that includes a heat transfer member 95 that comprises channels 135 through which heat transfer liquid flows. Cardella further teaches that size, number and arrangement of channels 135 is selected as per thermal transfer requirements (column 5, line 61 to column 6, line 20).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to control (optimize) the dimension of coolant liquid flow passage as taught by Cardella in the apparatus of [Tamura et al (805) – as evidenced by Tamura et al (178)] in view of Kadotani et al to obtain desired heat transfer rate between the heat transfer member and the substrate.

Regarding Claim 18: [Tamura et al (805) – as evidenced by Tamura et al (178)] discloses the heat transfer member can comprise a holding member 53 with a flow passage (base) and a metallic member 52 (cover) overlying the base (Figures 15, 16 and column 19, lines 1-20).

Regarding Claim 23: Tamura et al discloses a plasma processing apparatus comprising the substrate support of Claim 1 (Fig. 1).

Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over [Tamura et al (US 6,676,805) – as evidenced by Tamura et al (US PGPUB No. 2001/0009178)] in view of Kadotani et al (US PGPUB No. 2004/0163601) and Cardella (US Patent No. 6,184,504) as applied to Claim 15 and further in view of Matsumura et al (US patent No. 5,225,663).

Regarding Claim 16: [Tamura et al (805) – as evidenced by Tamura et al (178)] in view of Kadotani et al and Cardella teach all limitations of the claim except thickness of heat transfer member.

Matsumura et al teach an apparatus (Figures 1-3) for processing a semiconductor wafer 8 comprising of a heat transfer plate 1 (having a conductive film heater 2) and a heat insulator 5. Matsumura et al also teach that the heat transfer plate 1A is made of aluminum and can have a thickness varying from 0.1 to 5 mm and that thickness of heat transfer plate is directly related to its heat transfer capacity. Matsumura et al further teach (Figure 2) that by controlling the thickness of heat transfer plate (besides other factors), the heat capacity required and time taken to heat the wafer to a desired temperature could be controlled. Thus, prior art teaching by Matsumura et al anticipates the claimed thickness of heat transfer plate (that is, 1/8 to ¼ inches or 3.17 mm to 6.35 mm) [column 4, line 5 to column 6, line 25].

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to optimize the maximum thickness of heat transfer member (and thus optimize its thermal mass) as taught by Matsumura et al in the apparatus of [Tamura et al ('805) and as evidenced by Tamura et al ('178)] in view of Kadotani et al and Cardella as an additional control variable for quickly raising and lowering the temperature of heat transfer plate (column 1, lines 49-68).

Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tamura (US 6,676,805) in view of Kadotani et al (US PGPUB No. 2004/0163601) and Cardella (US Patent No. 6,184,504) as applied to claim 15 and further in view of Yang et al (US 6,635,580).

Regarding Claim 17: [Tamura et al (805) – as evidenced by Tamura et al (178)] in view of Kadotani et al and Cardella teach all limitations of the claim including a controller operable to control operation of the coolant fluid [Column 15 Lines 41-47 – Tamura et al "805)].

[Tamura et al (805) – as evidenced by Tamura et al (178)] in view of Matsumura et al and Kadotani et al do not teach a heat transfer gas source operable to supply a heat transfer gas between the support surface and the substrate and a controller operable to control operation of the heat transfer gas source.

Yang et al discloses a controller operable to control operation of the heat transfer gas source (Fig. 3 Item 80) [column 6, lines 25-50].

At the time of invention it would have been obvious to a person of ordinary skill in the art to use a controller operable to control operation of the heat transfer gas source as taught by Yang et al in the apparatus of [Tamura et al (805) – as evidenced by Tamura et al (178)] in view of Kadotani et al and Cardella to control operation of the heat transfer gas, thereby enable control the temperature of the substrate.

Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over [Tamura et al (US 6,676,805) – as evidenced by Tamura et al (US PGPUB No. 2001/0009178)] in view of Kadotani et al (US PGPUB No. 2004/0163601) and Cardella (US Patent No. 6,184,504) as applied to Claim 15 and further in view of Yatsuda et al (US Patent No. 6,488,863) and Mahawili (US patent No. 6,007,635).

Regarding Claim 19: [Tamura et al (805) – as evidenced by Tamura et al (178)] in view of Kadotani et al and Cardella teach all limitations of the claim except ceramic member having recess to seat the heat transfer member and electrostatic chuck contacts the flange.

Yatsuda et al discloses a substrate support (Figure 1) that includes a ceramic insulating member 20 (ceramic member) which has a recessed surface and a flange and where an aluminum worktable 18 (heat

transfer member) is disposed on the recessed portion of the ceramic member. Yatsuda et al further teach that an electrostatic chuck 28 is in contact with the flange portion of the ceramic member 20.

Yatsuda et al do not teach that worktable (heat transfer member) 18 is laterally spaced from the flange but it would be obvious to keep a gap (space) between the flange and the worktable (heat transfer member) to allow for thermal expansion of the heat transfer member that is a metallic member (aluminum).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use ceramic member having a recess as taught by Yatsuda et al in the apparatus of [Tamura et al (805) – as evidenced by Tamura et al (178)] in view of Kadotani et al and Cardella to enable proper support and insulation for the heat transfer member.

[Tamura et al (805) – as evidenced by Tamura et al (178)] in view of Kadotani et al, Cardella and Yatsuda et al do not expressely teach gap between flange and heat transfer member.

Mahawili teach a substrate support apparatus (Figure 1) that includes a second member 18 with a support surface (recess) 20. Mahawili also teach that recess is sized to allow radial (lateral) expansion of the first member (like heat transfer member) 14, that is, a gap is provided between the flange and the heat transfer member (column 4, lines 20-35).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use ceramic member configuration with a gap between flange and heat transfer member as taught by Mahawili in the apparatus of [Tamura et al (805) – as evidenced by Tamura et al (178)] in view of Kadotani et al, Cardella and Yatsuda et al to allow for thermal expansion of heat transfer member (metallic) [column 4, lines 30-35].

Claims 20, 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over [Tamura et al (US 6,676,805) – as evidenced by Tamura et al (US PGPUB No. 2001/0009178)] in view of Kadotani et al

(US PGPUB No. 2004/0163601) and Cardella (US Patent No. 6,184,504) as applied to Claim 15 and further in view of Mimura et al (US Patent No. 7,022,616).

Regarding Claim 20: [Tamura et al (805) – as evidenced by Tamura et al (178)] in view of Kadotani et al and Cardella teach all limitations of the claim including the substrate support further comprising a ceramic susceptor (like a ring) 36 (Figure 9 and Column 15, lines 20-23 – Tamura et al) overlying the ceramic member 40 and surrounding the heat transfer member 2 and the dielectric member (electrostatic chuck) 18, the heat transfer member being laterally spaced from the ceramic ring.

[Tamura et al (805) – as evidenced by Tamura et al (178)] in view of Kadotani et al and Cardella teach that the susceptor ring 36 serves as a cover for dielectric material 18, but do not teach the susceptor (ring) 36 contacts the electrostatic chuck.

Mimura et al teach a plasma apparatus (Figure 1) comprising a substrate support table 2 on which an electrostatic chuck 6 is disposed and where a focus ring (ceramic ring) 5 surrounds and contacts the electrostatic chuck 6 (column 3, lines 5-65).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention use a ceramic ring that contacts and surrounds an electrostatic chuck as taught by Mimura et al in the apparatus of [Tamura et al (805) – as evidenced by Tamura et al (178)] in view of Kadotani et al and Cardella to shield the electrostatic chuck from deposition by the reaction products.

Regarding Claim 21: Mimura et al teach RF power sources 15, 26 connected to table 2 (heat transfer member) [Figure 1 and column 3, lines 10-25].

Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over [Tamura et al (US 6,676,805) – as evidenced by Tamura et al (US PGPUB No. 2001/0009178)] in view of Kadotani et al (US PGPUB No. 2004/0163601) and Cardella (US Patent No. 6,184,504) as applied to claim 15 and further in view of Wang et al (US PGPUB No. 2002/0075624).

Regarding Claim 11: [Tamura et al (805) – as evidenced by Tamura et al (178)] in view of Kadotani et al and Cardella teach all limitations of the claim except the substrate support further comprising an elastomeric joint between the ceramic member and the heat transfer member, and an elastomeric joint between the heat transfer member and the electrostatic chuck.

Wang et al teach a plasma apparatus (Figures 1, 2, 6) comprising an electrostatic chuck assembly 55 that includes an electrostatic member 100 is bonded to base 175 (heat transfer member) by a ductile and compliant layer 250 (elastomeric joint). Wang et al also teach that base 175 is in turn bonded to support 190 (ceramic member) by a compliant and ductile material 295 (elastomeric joint) [paragraphs 0036, 0038, 0056, 0063, 0066].

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention use elastomeric joints for bonding ceramic member, electrostatic chuck and heat transfer member as taught by Wang et al in the apparatus of [Tamura et al (805) – as evidenced by Tamura et al (178)] in view of Kadotani et al and Cardella to absorb thermal stresses arising doe to different thermal coefficients of expansion of the interfacing materials (paragraph 0056).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rakesh K. Dhingra whose telephone number is (571)-272-5959. The examiner can normally be reached on 8:30 -6:00 (Monday - Friday).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571)-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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